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STRUCTURED ANALYSIS/DESIGN

LSA TASK 301

FUNCTIONAL REQUIREMENTS IDENTIFICATION

SUBTASK 301.2.3
FUNCTIONAL REQUIREMENTS RISK ANALYSIS

APJ 966-242

APJ

MILITARY & SCIENTIFIC RESEARCH

AMERICAN POWER JET CO. RIDGEFIELD N.J.

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19. ABSTRACT (*Continue on reverse if necessary and identify by block number*)

This report consolidates the Structured Analysis and Structured Design for the Logistic Support Analysis (LSA) Tasks. Included are the Data Flow Diagrams, (DFDs) for LSA Subtask 301.2.3, "Functional Requirements Risk Analysis", and the corresponding descriptions of the processes, data flows, data stores, and external entities identified on each DFD. The DFDs are further developed into procedures which identifies how to use the data to carry out the processes and accomplish the LSA Subtask. Venture Evaluation Review Technique (VERT) Batch Input files are also provided to assist as tools, giving both technical and managerial aspects of a task.

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APJ 966-242

STRUCTURED ANALYSIS/DESIGN

LSA TASK 301
FUNCTIONAL REQUIREMENTS IDENTIFICATION

SUBTASK 301.2.3
FUNCTIONAL REQUIREMENTS RISK ANALYSIS

under

CONTRACT DAAA21-86-D-0025

for

HQ, US AMCCOM
INTEGRATED LOGISTIC SUPPORT OFFICE
AMSMC-LSP
ROCK ISLAND, IL

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AMERICAN POWER JET COMPANY

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January 1990

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FOREWORD

APJ, under contract to HQs, AMCCOM, has initiated the automation of the LSA Tasks (MIL-STD-1388-1), and the assessment of the ILS elements (AR 700-127). A major goal is to unify military and contractor approach to the performance of ILS and LSA.

Detailed to meet all requirements of ILS and LSA, the automated process will continue to provide the flexibility in selecting tasks and elements to be addressed at each life cycle stage. A major advantage of this approach is to insure that the application of each task is consistent with prescribed Army policies and procedures.

This report consolidates the Structured Analysis and Structured Design under one cover for the respective LSA Tasks. Structured Analysis provides a logical model of the method to perform an LSA Task. This logical model facilitates the development of a Structured Design that provides the detailed procedures to perform the analysis. Both the logical model and detailed procedures are used to develop the application software programs which will be provided to Government and contractor personnel to assist in the performance of the LSA Task.

Included in this report are the Data Flow Diagrams (DFDs) for LSA Subtask 301.2.5, "Functional Requirement Risk Analysis" and the corresponding descriptions of the processes, data flows, data stores, and external entities identified on each DFD (Annex B). In addition, the DFDs are further developed into step-by-step procedures (Annex C) which identifies how to use the data to carry out the processes which ultimately lead to accomplishing the LSA Subtask.

To assist managers in planning and controlling this task, Venture Evaluation Review Technique (VERT) Batch Input files are provided (Annex D). These VERT tools provide government agencies with complete packages to give contractors that cover both technical and managerial aspects of a task. This approach establishes a standardized form of communication and management between contractors performing the task and government personnel reviewing the task.

To view this work in context, Annex E of this report also presents a brief overview of Structured Analysis and its place in the overall systems development process. The overview and certain portions of the introductory text are repeated verbatim in every report in this series so that each report is free standing.

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INTRODUCTION

PURPOSE

The purpose of this report series is to present the results of the APJ efforts under Contract DAAA21-86-D-0025 for coordination with the AMCCOM Program Manager prior to in-depth programming of ILS and LSA functions and processes. LSA Task 301, "Functional Requirements Risk Identification" (LSA Subtask 301.2.3 "Functional Requirement Risk Analysis") is addressed in this report.

BACKGROUND

The Department of the Army has a requirement for management control over contractor and Government agency response to the requirements of AR 700-127, "Integrated Logistic Support", and MIL-STD-1388-1, "Logistic Support Analysis". HQs AMCCOM has initiated action to structure each of the LSA tasks, the assessment of each ILS element, the form of the results, and the detailed processes to insure consistency with current Army policies, procedures, and techniques.

This approach (undertaken by AMCCOM and APJ) will insure uniformity in efforts and products, reproducibility of analyses, and a well-defined structure which can be coordinated among all participants in the logistic process to arrive at common understanding and procedures.

SCOPE

This report summarizes the results of the Structured Analysis of LSA Task 301, "Functional Requirements Identification", LSA Subtask 301.2.3, "Functional Requirements Risk Identification", and presents the associated Data Flow Diagrams (DFDs) developed from the Structured Analysis. The portions of the Data Dictionary relating to labels, names, descriptions, processes, data flows, data stores, and external entities are included in their present degree of completeness. (The Data Dictionary is a "living document" that evolves through the analysis and design process).

The Data Dictionaries developed for each of the individual LSA Subtasks are integrated together into a Master Data Dictionary. Integration of the individual Data Dictionary involves the combination of simular Data Flows, Data Stores, and External Entities. The resulting Master Data Dictionary may well contain some minor differences from the definitions that appear in this report. All processes, and of course, the content of the structured design will remain identical.

The Structured Design portion of this report develops the processes and data flows developed in the DFDs into procedures which are used to accomplish the LSA Tasks. The DFDs provide the method and the Design implements it, by formulating a guide for programmers to write software applications.

This report presents a brief overview of Structured Analysis and its place in the overall systems design process to assist the reader who may not be fully briefed on the symbols and conventions used. It is supported by Annex E, which defines each element in Structured Analysis, and by a separate Glossary.

LSA SUBTASK 301.2.3 DESCRIPTION

Subsequent to the identification and documentation of operational and support functions, as accomplished in LSA Subtask 301.2.1, and the identification of unique functional requirements and supportability, cost and readiness drivers, as accomplished in LSA Subtask 301.2.2, functional requirements risk identification is performed. This process is used to develop areas of potential risk associated with each of the functions previously identified.

LSA Subtask 301.2.3 is designed to alert program managers and analysts so that special emphasis is required concerning these risk areas.

Risks identified in earlier LSA Subtask actions (LSA tasks 202, 203, 204, 205) have the potential for impact upon LSA Subtask 301.2.3, therefore, a detailed assessment of this potential is made. Adverse (risk) impacts are documented.

Since the greatest potential for functional requirements risk is generated by new design technology and/or operational concepts, special emphasis is placed on LSA Subtask 301.2.2 functions/drivers as possessing the greatest potential for functional risk.

Annotations of risk relationships and rationale for risk classification is made in this subtask to assure an audit trail for follow on analyses. The results of this subtask will be utilized in subsequent LSA Tasks efforts to insure full consideration of functional potential risks associated with system development.

APPROACH

The APJ approach to Structured Analysis of the LSA task is:

1. Scope the process defined in MIL-STD-1388-1A in the context of the other LSA tasks.

2. Review the guidance provided in AMC PAM 700-11, "Logistics Support Analysis Review Team Guide".

3. Review the applicable Data Item Descriptions (DIDs) from the Acquisition Management Systems and Data Requirements Control List (AMSDL) published by the Department of Defense.

4. Review all source documents referenced in the AMSDL as applicable to the referenced DIDs of interest.

STRUCTURED ANALYSIS FOR LSA SUBTASK 301.2.3 - FUNCTIONAL REQUIREMENTS RISK ANALYSIS

The Data Flow Diagram is a tool that shows the flow of data, (i.e., data flows from sources) and is processed by activities to produce intermediate or final products.

The DFD provides a useful and meaningful partitioning of a system from the viewpoint of identification and separation of all functions, actions, or processes so that each can be introduced, changed, added, or deleted with minimal disruption of the overall program, i.e., it emphasizes the underlying concept of modularity and identifiable transformations of data into actionable products.

A series of three (3) DFDs have been developed to structure the LSA subtask relative to operations and other support functions:

1. 301.2.3 Functional Requirements Risk Identification
2. 301.2.3.3A Functional Requirements/BCS Review
3. 301.2.3.7A Functions/Requirements Risk Validation

Each DFD is keyed to the specific task (LSA, in this case) through the identification number assigned in the lower right hand box. The Alpha codes indicate the level of indenture or explosion below the top level, i.e.,:

Top level.....LSA DFD 301.2.3
First Indenture.....LSA DFD 301.2.3.3A

Each DFD makes reference to the basic LSA task it addresses, as well as the level of indenture (explosion) of the DFD. For example, the first or top level DFD, 301.2.3 refers to the paragraph in MIL-STD-1388-1A which describes the task. One of the processes (bubbles) on the top level diagram (301.2.3.3) is expanded and identified as "301.2.3.3A", a second level of 301.2.3.3" (Alpha "A" indicates second level).

Four standard symbols are used in the drawing of a DFD (see Annex E, Figure 2).

A copy of each DFD is presented in Annex B, accompanied by the Data Dictionary process elements. Each entry made in the DFDs has a corresponding entry in the Data Dictionary, immediately following each of the DFDs.

VERT DIAGRAMS

The Venture Evaluation Review Technique (VERT) was developed as a network analysis technique to facilitate management decision making. It allows systematic planning and control of programs and enables managers to find solutions to real life managerial problems. The VERT Diagrams and Input Files for this task can be found in Annex D. In order to understand how these Input Files were developed, a brief discussion of the methodology used is provided. The same explanation is repeated verbatim in every report.

ANNEX A

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LSA TASK 301
FUNCTIONAL REQUIREMENTS IDENTIFICATION

ANNEX A

LSA TASK 301

FUNCTIONAL REQUIREMENTS IDENTIFICATION*

301.1 PURPOSE. To identify the operations and support functions that must be performed for each system/equipment alternative under consideration and then identify the tasks that must be performed in order to operate and maintain the new system/equipment in its intended environment.

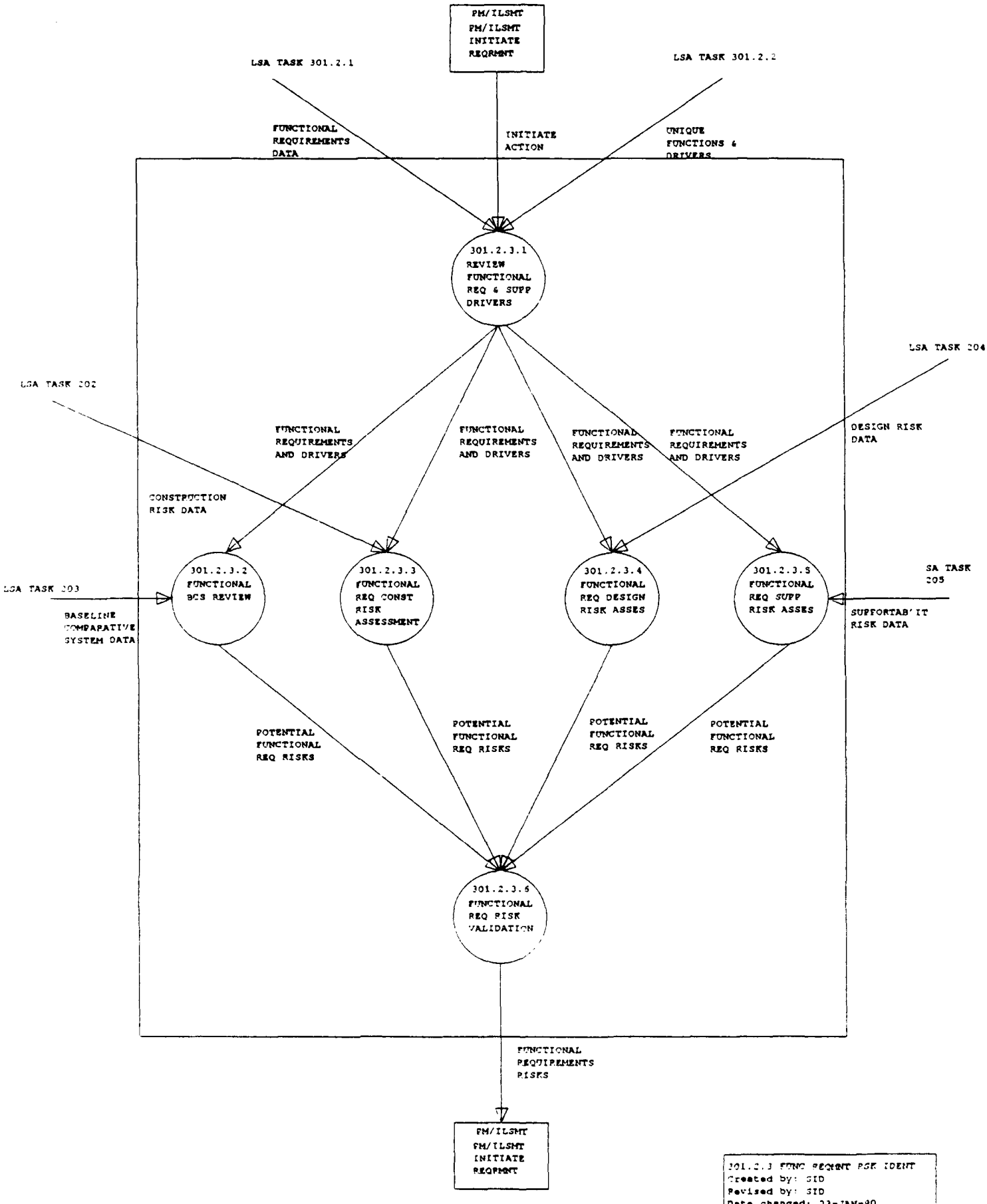
301.2 TASK DESCRIPTION

301.2.3 Identify any risks involved in satisfying the functional requirements of the new system/equipment.

* Abstracted verbatim from MK-STD-1388-1A, 11 April 1983, page 31.

ANNEX B

SUBTASK 301.2.3
FUNCTIONAL REQUIREMENTS RISK ANALYSIS
DATA FLOW DIAGRAMS AND DATA DICTIONARY


PM/ILSMT
PM/ILSMT
INITIATE
REQRMNT
LSA TASK 301.2.1
LSA TASK 301.2.2
FUNCTIONAL
REQUIREMENTS
DATA
INITIATE
ACTION
UNIQUE
FUNCTIONS &
DRIVERS
301.2.3.1
REVIEW
FUNCTIONAL
REQ & SUPP
DRIVERS
LSA TASK 204
LSA TASK 202
FUNCTIONAL
REQUIREMENTS
AND DRIVERS
FUNCTIONAL
REQUIREMENTS
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REQUIREMENTS
AND DRIVERS
FUNCTIONAL
REQUIREMENTS
AND DRIVERS
DESIGN RISK
DATA
CONSTRUCTION
RISK DATA
301.2.3.2
FUNCTIONAL
BCS REVIEW
301.2.3.3
FUNCTIONAL
REQ CONST
RISK
ASSESSMENT
301.2.3.4
FUNCTIONAL
REQ DESIGN
RISK ASSES
301.2.3.5
FUNCTIONAL
REQ SUPP
RISK ASSES
LSA TASK 203
BASELINE
COMPARATIVE
SYSTEM DATA
SA TASK
205
SUPPORTAB'IT
RISK DATA
POTENTIAL
FUNCTIONAL
REQ RISKS
POTENTIAL
FUNCTIONAL
REQ RISKS
POTENTIAL
FUNCTIONAL
REQ RISKS
POTENTIAL
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301.2.3.6
FUNCTIONAL
REQ RISK
VALIDATION
FUNCTIONAL
REQUIREMENTS
RISKS
PM/ILSMT
PM/ILSMT
INITIATE
REQRMNT
301.2.3 FUNC REQMNT RSK IDENT
Created by: SID
Revised by: SID
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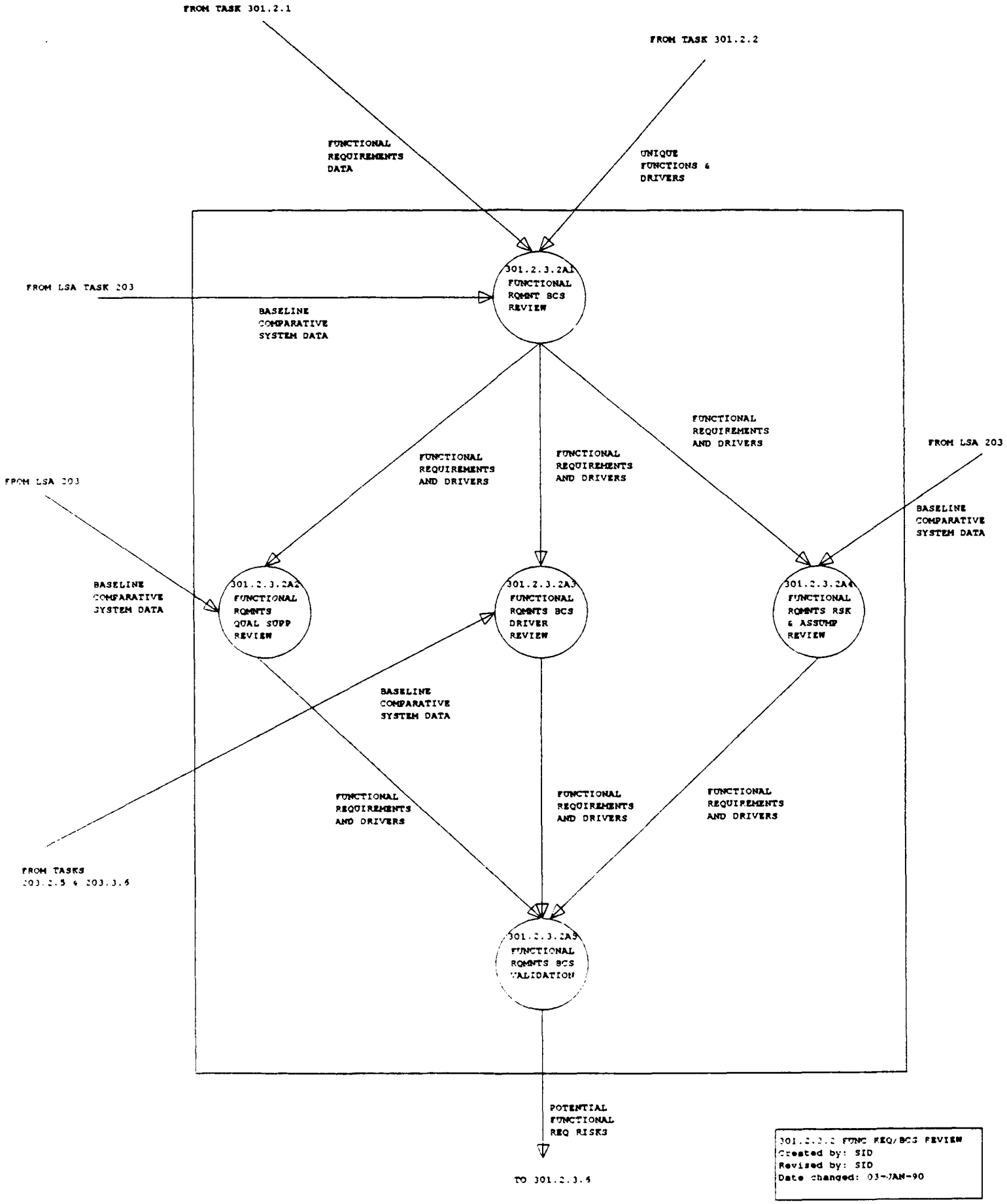
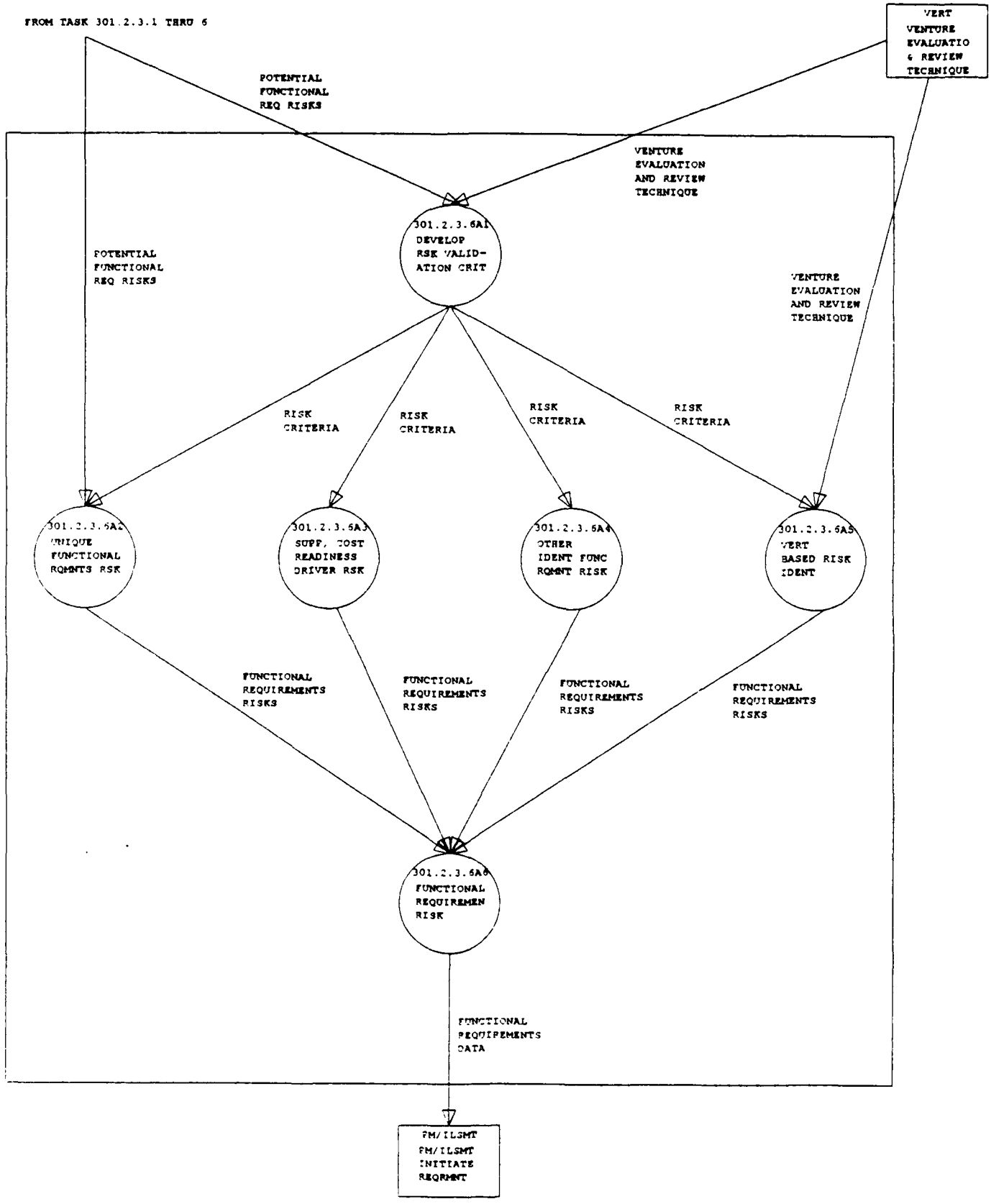

FROM TASK 301.2.1
FROM TASK 301.2.2
FUNCTIONAL REQUIREMENTS DATA
UNIQUE FUNCTIONS & DRIVERS
FROM LSA TASK 203
BASELINE COMPARATIVE SYSTEM DATA
301.2.3.2A1 FUNCTIONAL RQMNT BCS REVIEW
FUNCTIONAL REQUIREMENTS AND DRIVERS
FUNCTIONAL REQUIREMENTS AND DRIVERS
FUNCTIONAL REQUIREMENTS AND DRIVERS
FROM LSA 203
FROM LSA 203
BASELINE COMPARATIVE SYSTEM DATA
BASELINE COMPARATIVE SYSTEM DATA
301.2.3.2A2 FUNCTIONAL RQMNTS QUAL SUPP REVIEW
301.2.3.2A3 FUNCTIONAL RQMNTS BCS DRIVER REVIEW
301.2.3.2A4 FUNCTIONAL RQMNTS RSK & ASSUMP REVIEW
BASELINE COMPARATIVE SYSTEM DATA
FUNCTIONAL REQUIREMENTS AND DRIVERS
FUNCTIONAL REQUIREMENTS AND DRIVERS
FUNCTIONAL REQUIREMENTS AND DRIVERS
FROM TASKS 203.2.5 & 203.3.6
301.2.3.2A5 FUNCTIONAL RQMNTS BCS VALIDATION
POTENTIAL FUNCTIONAL REQ RISKS
TO 301.2.3.6
301.2.3.2 FUNC REQ/BCS REVIEW
Created by: SID
Revised by: SID
Date changed: 03-JAN-90


FROM TASK 301.2.3.1 THRU 6
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301.2.3.6A2
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FUNCTIONAL
RQMNTS RSK
301.2.3.6A3
SUPP, COST
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301.2.3.6A4
OTHER
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RQMNT RISK
301.2.3.6A5
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IDENT
FUNCTIONAL
REQUIREMENTS
RISKS
FUNCTIONAL
REQUIREMENTS
RISKS
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REQUIREMENTS
RISKS
FUNCTIONAL
REQUIREMENTS
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301.2.3.6A6
FUNCTIONAL
REQUIREMEN
RISK
FUNCTIONAL
REQUIREMENTS
DATA
FM/ILSMT
FM/ILSMT
INITIATE
REQRMNT
301.2.3.6 FUNC REQ RSK VALID
Created by: SID
Revised by: SID
Date changed: 03-JAN-90

Name	Label	Description
301.2.3.1	REVIEW FUNCTIONAL REQ & SUPP DRIVERS	PURPOSE: THE OBJECTIVE OF THIS PROCESS IS TO REVIEW THE RESULTS OF LSA SUBTASKS 301.2.1 AND 301.2.2 WHICH, TOGETHER IDENTIFIED AND DOCUMENTED THE FUNCTIONAL REQUIREMENTS, UNIQUE TO THE SYSTEM/EQUIPMENT RESULTING FROM NEW DESIGN TECHNOLOGY, OPERATIONAL CONCEPTS, SUPPORTABILITY, COST AND READINESS DRIVERS. PROCEDURES: 1. OBTAIN RESULTS OF SUBTASK 301.2.1 AND 301.2.2. 2. MATCH, AND RECORD THE FUNCTIONAL REQUIREMENTS FOR EACH ALTERNATIVE SYSTEM WITH THE SUPPORTABILITY, COST AND READINESS DRIVERS, AND UNIQUE SYSTEM/EQUIPMENT FUNCTIONAL REQUIREMENTS.
301.2.3.2	FUNCTIONAL BCS REVIEW	PURPOSE: TO EVALUATE FUNCTIONAL REQUIREMENTS, UNIQUE FUNCTIONAL REQUIREMENTS AND SUPPORTABILITY, COST AND READINESS DRIVERS PREVIOUSLY IDENTIFIED AGAINST THE BASELINE COMPARISON SYSTEM DEVELOPED IN LSA TASK 203 TO PROVIDE HISTORICAL DATA UPON WHICH TO BASE RISK DETERMINATIONS.
301.2.3.2A1	FUNCTIONAL RQMNT BCS REVIEW	PURPOSE: DETERMINE THROUGH REVIEW OF LSA SUBTASK 203.2.2, THE RELATIONSHIPS THAT MAY EXIST, BETWEEN THE BASELINE COMPARATIVE SYSTEM AND THE FUNCTIONAL REQUIREMENTS AND DRIVERS PREVIOUSLY IDENTIFIED.
301.2.3.2A2	FUNCTIONAL RQMNTS QUAL SUPP REVIEW	PURPOSE: REVIEW THE QUALITATIVE SUPPORTABILITY PROBLEMS IDENTIFIED IN LSA SUBTASK 203.2.4 AGAINST FUNCTIONAL REQUIREMENTS, UNIQUE FUNCTIONS AND SUPPORTABILITY, COST AND READINESS DRIVERS TO IDENTIFY HISTORICALLY SIGNIFICANT IMPACTS UPON THE NEW SYSTEM/EQUIPMENT.
301.2.3.2A3	FUNCTIONAL RQMNTS BCS DRIVER REVIEW	PURPOSE: THE OBJECTIVE OF THIS PROCESS IS TO COMPARE THE FUNCTIONAL REQUIREMENTS FOR THE NEW SYSTEM/EQUIPMENT WITH THE HISTORICAL SUPPORTABILITY, COST AND READINESS DRIVER DATA CONTAINED IN LSA SUBTASKS 203.2.5 AND 203.2.6 AND DETERMINE POTENTIAL PROGRAM RISKS.
301.2.3.2A4	FUNCTIONAL RQMNTS RSK & ASSUMP REVIEW	PURPOSE: THE OBJECTIVE OF THIS PROCESS IS TO DETERMINE IF THE RISKS AND ASSUMPTIONS ASSOCIATED WITH THE USE OF COMPARAITVE SYSTEMS (LSA SUBTASK 203.2.8) INFLUENCE THE FUNCTIONAL REQUIREMENTS, UNIQUE REQUIREMENTS AND SUPORTABILITY, COST AND READINESS DRIVERS FOR NEW SYSTEM/EQUIPMENT.
301.2.3.2A5	FUNCTIONAL RQMNTS BCS VALIDATION	PURPOSE: THIS PROCESS ASSESSSES THE RESULTS OF THE PRECEEDING REVIEWS OF FUNCTIONAL REQUIREMENTS, UNIQUE REQUIREMENTS AND SUPPORTABILITY, COST AND READINESS DRIVER REVIEW WITH THE BASELINE COMPARISON. AS A RESULT, POTENTIAL FUNCTIONAL RISKS ARE IDENTIFIED.

Name	Label	Description
301.2.3.3	FUNCTIONAL REQ CONST RISK ASSESSMENT	PURPOSE: THE OBJECTIVE OF THIS PROCESS IS TO ASSESS RELATIONSHIPS BETWEEN THE FUNCTIONAL REQUIREMENTS AND SUPPORTABILITY, COST AND READINESS DRIVERS AND RISKS ASSOCIATED WITH SUPPORTABILITY CONSTRAINTS.
301.2.3.4	FUNCTIONAL REQ DESIGN RISK ASSES	PURPOSE: THE PURPOSE OF THIS PROCESS IS TO DETERMINE THE RELATIONSHIPS THAT EXIST BETWEEN THE RISKS ASSOCIATED WITH DESIGN OBJECTIVES, AS IDENTIFIED IN LSA SUBTASK204, AND FUNCTIONAL REQUIREMENTS AND SUPPORTABILITY, COST AND READINESS DRIVERS.
301.2.3.5	FUNCTIONAL REQ SUPP RISK ASSES	PURPOSE: THE OBJECTIVE OF THIS PROCESS IS TO ASSSS THE RELATIONSHIP OF SUPPORTABILITY RISKS ASSOCIATED WITH NEW TECHNOLOGY AND SUPPORTABILITY, COST AND READINESS OBJECTIVES RISK AS IDENTIFIED IN LSA SUBTASK 205.2.2, AND FUNCTIONAL REQUIREMENTS, UNIQUE FUNCTIONAL REQUIREMENTS AND SUPPORTABILITY, COST AND READINESS DRIVERS.
301.2.3.6	FUNCTIONAL REQ RISK VALIDATION	PURPOSE: THE OBJECTIVE OF THIS PROCESS IS TO ASSESS THE POTENTIAL FUNCTIONAL REQUIREMENT RISKS IDENTIFIED THROUGH COMPARATIVE ANALYSIS IN PROCESSES 301.2.3.2 THROUGH 301.2.3.5 AND VALIDATE WHEN JUSTIFIED THESE POTENTIAL RISKS AS RISKS INVOLVED IN SATISFYING NEW SYSTEM/EQUIPMENT FUNCTIONAL REQUIREMENTS.
301.2.3.6A1	DEVELOP RSK VALID-ATION CRIT	PURPOSE: THIS PROCEDURE IS DESIGNED TO ESTABLISH CRITERIA UPON WHICH TO VALIDATE THE PREVIOUSLY IDENTIFIED POTENTIAL NEW SYSTEM/EQUIPMENT FUNCTIONAL REQUIREMENTS RISKS, AS RISKS INVOLVED IN SATISFYING FUNCTIONAL REQUIREMENTS.
301.2.3.6A2	UNIQUE FUNCTIONAL RQMNTS RSK	PURPOSE: THIS PROCESS UTILIZES THE FUNCTIONAL REQUIREMENT WORKSHEET, (ANNEX C) INCLUDING THE ASSESSMENTS MADE IN PRIOR PROCESSES, AND THE RISK VALIDATION CRITERIA OF PROCESS 301.2.3.6A1 TO IDENTIFY UNIQUE FUNCTIONAL REQUIREMENT RISKS.
301.2.3.6A3	SUPP, COST READINESS DRIVER RSK	PURPOSE: THIS PROCESS UTILIZES THE FUNCTIONAL REQUIREMENTS WORKSHEET, (ANNEX C) INCLUDING THE ASSESSMENTS MADE IN PRIOR PROCESSES, AND THE RISK VALIDATION CRITERIA IN PROCESS 301.2.6A1 TO IDENTIFY SUPPORTABILITY, COST AND READINESS RISKS.
301.2.3.6A4	OTHER IDENT FUNC RQMNT RISK	PURPOSE: THIS PROCESS UTILIZES THE FUNCTIONAL REQUIREMENTS WORKSHEET (ANNEX C), INCLUDING THE ASSESSMENTS MADE IN PRIOR PROCESSES, AND THE RISK VALIDATION CRITERIA IN PROCESS 301.2.3.6A1 TO IDENTIFY OTHER IDENTIFIABLE FUNCTIONAL REQUIREMENTS.

	Name	Label	Description
	301.2.3.6A5	VERT BASED RISK IDENT	PURPOSE: THIS PROCESS IS DESIGNED TO ANALYZE THE POTENTIAL FUNCTIONAL REQUIREMENT RISKS NOT PREVIOUSLY IDENTIFIED IN PROCESSES 301.2.3.6A2 THROUGH 301.2.3.6A4, AS FUNCTIONAL RISKS, AND OR TO PROVIDE A DETAILED ANALYTICAL PROCEDURE FOR USE IN IDENTIFYING FUNCTIONAL REQUIREMENT RISKS WHERE INDEPTH ANALYSIS IS REQUIRED.
	301.2.3.6A6	FUNCTIONAL REQUIREMEN RISK	PURPOSE: USE THIS PROCESS TO ORGANIZE AND PRESENT THE FUNCTIONAL REQUIREMENTS RISKS IDENTIFIED IN LSA TASK 301.2.3.

Name	Label	Description
BCS/DTA	BASELINE COMPARATIVE SYSTEM DATA	THIS DATA FLOW CONTAINS DATA CONCERNING THE BASELINE COMPARISON SYSTEM DEVELOPED FOR USE IN COMPARATIVE ANALYSIS AND IN IDENTIFYING SUPPORTABILITY, COST AND READINESS DRIVERS. SOURCE: LSA TASK 203
CONST/RSK/DTA	CONSTRUCTION RISK DATA	THIS DATA FLOW CONTAINS RISKS IDENTIFIED AS BEING ASSOCIATED WITH SUPPORTABILITY AND SUPPORTABILITY RELATED DESIGN CONSTRAINTS. SOURCE: LSA TASK 202
DES/RSK/DTA	DESIGN RISK DATA	THIS DATAFLOW CONTAINS RISKS ASSOCIATED WITH ESTABLISHED DESIGN OBJECTIVES, APPROACHES NEEDED TO VERIFY IMPROVEMENT POTENTIAL, AND ANY COST AND SCHEDULE IMPACTS. SOURCE: LSA TASK 204
FUNC/RQMTS	FUNCTIONAL REQUIREMENTS DATA	THIS DATAFLOW CONTAINS THOSE ITEMS IDENTIFIED AS NEW SYSTEM/EQUIPMENT FUNCTIONAL REQUIREMENTS SOURCE: TASK 301
FUNC/RQMTS/DRIVERS	FUNCTIONAL REQUIREMENTS AND DRIVERS	THESE DATA FLOWS REPRESENT THE COMBINED RESULTS OF LSA TASK 301.2.1 AND 301.2.2 AND PERMITS THE ANALYST TO ACCESS THE COMBINED FUNCTIONAL REQUIREMENTS, UNIQUE FUNCTIONAL REQUIREMENTS, AND SUPPORTABILITY, COST AND READINESS DRIVERS. FOR THE NEW SYSTEM EQUIPMENT.
FUNC/RQMTS/RISKS	FUNCTIONAL REQUIREMENTS RISKS	THIS DATA FLOW TRANSMITS THE RESULTS OF LSA SUBTASKS 301.2.3 EFFORTS TO THE REQUIRING AUTHORITY. THE RESULTS OF LSA SUBTASK 301.2.3 ARE TRANSMITTED TO THE PROJECT MANAGER WHO WILL MAKE A DETERMINATION AS TO WHICH OF THE IDENTIFIED RISKS NEED TO BE SUBJECTED TO A QUANTITATIVE DECISION RISK ANALYSIS TECHNIQUE.
INIT/ACT	INITIATE ACTION	PURPOSE: DATA IDENTIFYING THE NEED FOR ASSESSING AN ALTERNATIVE SYSTEM/EQUIPMENT. THIS NEED MAY BE BASED ON AN EVALUATION OF THE EXISTING MANPOWER/PERSONNEL REQUIREMENTS ON THE BASELINE SYSTEM/EQUIPMENT. THIS DATA: 1. ESTABLISHES MISSION PROFILE. 2. IDENTIFIES THE RESOURCES THAT EXIST AND/OR MUST BE DEVELOPED 3. ESTABLISH PRIORITIES. SOURCE OF DATA: PROGRAM MANAGER
POT/FUNC/RQMNTS/RISK	POTENTIAL FUNCTIONAL REQ RISKS	THESE DATA FLOW REPRESENT THE COMBINED FUNCTIONAL REQUIREMENTS, UNIQUE FUNCTIONAL REQUIREMENT, AND SUPPORTABILITY, COST AND READINESS DRIVERS (LSA TASKS 301.2.1 AND 301.2.2) WHICH HAVE BEEN MANIPULATED WITHIN THIS SUBTASK. THE FLOWS PRESENT THE ANALYST THOSE POTENTIAL FUNCTIONAL REQUIREMENT RISKS REQUIRING FURTHER VALIDATION.
RISK/CRIT	RISK CRITERIA	THIS DATA FLOW PROVIDES THE ANALYST CRITERIA UPON WHICH TO BASE FUNCTIONAL REQUIREMENTS RISK DETERMINATIONS. THESE CRITERIA ARE DEVELOPED IN PROCESS 301.2.3.6A1

	Name	Label	Description
	SUPP/RSK/DTA	SUPPORTAB'IT RISK DATA	THIS DATA FLOW CONTAINS RISKS ASSOCIATED WITH SYSTEM SUPPORTABILITY DEVELOPED IN LSA TASK 205.
	UNIQUE/FUNC/DRIVERS	UNIQUE FUNCTIONS & DRIVERS	THIS DATA FLOW CONTAINS UNIQUE FUNCTIONAL REQUIREMENTS, SUPPORTABILITY COST AND READINESS DRIVERS AS IDENTIFIED IN PROCESS 301.2.2
	VERT	VENTURE EVALUATION AND REVIEW TECHNIQUE	VERT IS A NETWORK ANALYSIS TECHNIQUE USED FOR PERFORMING DECISION RISK ANALYSIS FROM A VARIETY OF PROGRAM ASPECTS. THE TOOL MAKES IT POSSIBLE TO MODEL SYSTEM REQUIREMENTS AND ANALYZE THE OUTCOMES UNDER VARIOUS COST, SCHEDULE, AND MANPOWER CONSTRAINTS.

	Name	Label	Description
	PM/ILSMT	PM/ILSMT INITIATE REQRMNT	THE PROGRAM MANAGER OR THOSE ACTIVITIES, AGENCIES, OR AUTHORITIES THAT ARE RESPONSIBLE FOR THE INITITATION OF THE REQUIREMENT FOR AN ILS ELEMENT ASSESSMENT DURING A DEVELOPMENT PROGRAM FOR A SYSTEM AND/OR EQUIPMENT IN ACCORDANCE WITH AR 700-127. THE KEY ACTION (OUTPUT) REQUIRED OF THIS EXTERNAL ENTITY IS THE DIRECTIVE, AUTHORITY, OR OTHER DOCUMENTATION THE INITIATES THE REQUIREMENT FOR THE APPLICATION OF THIS ILS ASSESSMENT TO A SPECIFIC SYSTEM/EQUIPMENT DEVELOPMENT PROGRAM AT A SPECIFIED POINT IN ITS LIFE CYCLE.
	VERT	VENTURE EVALUATIO & REVIEW TECHNIQUE	A COMPUTERIZED , MATHEMATICALLY ORIENTED SIMULATION NETWORKING TECHNIQUE DESIGNED TO ASSESS RISKS.

ANNEX C

LSA SUBTASK 301.2.3

FUNCTIONAL REQUIREMENTS RISK ANALYSIS

ANNEX C
LSA SUBTASK 301.2.3
FUNCTIONAL REQUIREMENTS RISK ANALYSIS

PROCESS 301.2.3.1 Review Functional Requirement and Supportability Drivers

PURPOSE:

The objective of this process is to review the results of LSA Subtask 301.2.1 and 301.2.2, which together identified and documented the new and Unique Functional Requirement of the new system/equipment which were due to new design technology, operational concepts, supportability, cost or readiness drivers.

PROCEDURES:

1. Obtain results of Subtask 301.2.1 and 301.2.2

2. Match and record the functional requirements for each alternative system with the supportability, cost and readiness drivers, and unique system/equipment functional requirements.

3. Match the unique functional requirements and supportability, cost and readiness drivers against the appropriate functional requirements listed (Process 301.2.3.1). Identify matches between unique functions or drivers with system/equipment functional requirements.

NOTE: In all but the most exceptional case, each of these unique functional requirements and drivers will have a matching functional requirement identified. A detailed review of supporting rationale may be required to effect a match.

4. Should a positive match not be possible, document these unique requirements/drivers in the worksheet below the last functional requirement listed in the first column.

5. In the last column of the Functional Requirements and Support Driver list document the supporting rationale, references, source data, etc. relating to the unique functional requirements or drivers.

FUNCTIONAL REQUIREMENTS AND SUPPORT DRIVER LIST
(LSA SUBTASK 301.2.3.1)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

FUNCTIONAL REQUIREMENTS (LSA SUBTASK 301.2.1)	REMARKS	UNIQUE FUNCTIONAL RQTS. & DRIVERS (LSA SUBTASK 301.2.2)	REMARKS

GENERIC REMARKS FORM
(ALL PROCESSES)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

FUNCTIONAL REQUIREMENT OR DRIVER:

RISK DESCRIPTION OR REMARKS:

(TEXT DESCRIPTION)

AREAS IMPACTED (SUPPORTABILITY/COST/READINESS):

PROCESS 301.2.3.2 - Functional Requirements/BCS Evaluation

PURPOSE:

To evaluate functional requirements, unique functional requirements and supportability, cost and readiness drivers previously identified against the Baseline Comparison System developed in LSA Task 203 to provide historical data upon which to base risk determinations.

PROCESS 301.2.3.2A1 - Functional Requirements/BCS Review

PURPOSE:

Determine through review of LSA Subtask 203.2.2, the relationships that may exist, between the baseline comparative system and the functional requirements and drivers previously identified.

PROCEDURES:

1. Obtain LSA Subtask 203.2.2 results from the Program Manager's Office.

2. Utilizing Functional Requirement/BCS Evaluation Worksheet and the data developed in Processes 301.2.1 and 301.2.2, compare listed functional requirements, unique functions and supportability, cost and readiness drivers (columns 1 and 2) with the historical data available from LSA Subtask 203.2.2.

3. Determine those elements of the BCS data which directly influence or may influence the functional requirements and drivers. Record these influences in the column marked BCS Review of the Worksheet against the functional requirement or driver influenced.

4. Use the remarks column to record supporting rationale, reference data, source data, etc.

FUNCTIONAL REQUIREMENT/BCS EVALUATION
(PROCESS 301.2.3.2)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

FUNCTIONAL REQUIREMENTS (LSA SUBTASK 301.2.1)	UNIQUE FUNC. RQTS. & DRVRS (LSA SUBTASK 301.2.2)	BCS REVIEW (LSA SUB-TASK 203.2.3)	SUPPORTABILITY REVIEW (SUB-TASK 301.2.4)	DRIVER REV. (LSA SUBTASK 301.2.5) (LSA SUBTASK 301.2.6)	RISK & ASSUMP. REVIEW (LSA SUBTASK 203.2.5)	REMARKS	POTENTIAL FUNCTIONAL REQUIREMENTS RISKS

301.2.3.2A2 - Functional Requirements/Qualitative Supportability Review

PURPOSE:

Review the qualitative supportability problems identified in LSA Subtask 203.2.4 against functional requirements, unique functions and supportability, cost and readiness drivers to identify historically significant impacts upon the new system/equipment.

PROCEDURES:

1. Obtain LSA Subtask 203.2.4 results from the Program Manager's Office.

2. Determine if a direct relationship exists between any of the qualitative supportability problems identified for comparative systems and the functional/drivers of the new system/equipment.

3. Record those instances where a relationship is apparent in the column marked Supportability/Review, against the appropriate functional requirement, unique requirement or supportability, cost or readiness driver. Use the remarks column to document source date, references, rationale, etc.

302.2.3.2A3 - Functional Requirements/BCS Driver Review

PURPOSE:

The objective of this process is to compare the functional requirements for the new system/equipment with the historical supportability, cost and readiness driver data contain in LSA Subtasks 203.2.5 and 203.2.6 and determine potential program risks.

PROCEDURES:

1. Obtain the output of LSA Subtasks 203.2.5 and 203.2.6.

2. Review the supportability, cost and readiness drivers and historically significant data from LSA Subtask 203.2.5. Review the relationship of those drivers with the drivers determined in LSA Subtask 203.2.6.

3. As a result of this review, compare the resulting data with the information generated in Process 301.2.7.1 (Since LSA Subtask 203.2.6, "Identification of Supportability, Cost, and Readiness Drivers", is a source of data for LSA Subtask 301.2.2, "New Equipment Unique Functional Requirements", much of the supportability, cost and readiness driver information should already be recorded.)

4. Record results of the above comparative analysis in column marked Driver Review of the Worksheet. The remarks column will be used to record appropriate source data, references, rationale, etc.

PROCESS 301.2.3.2A4 - Functional Requirements/Risk and Assumption Review

PURPOSE:

The objective of this process is to determine if the risks and assumptions associated with the use of comparative systems (LSA Subtask 203.2.8) influence the functional requirements, unique requirements and supportability, cost and readiness drivers for new system/equipment.

PROCEDURES:

1. Obtain the results of LSA Subtask 203.2.8.

2. Review these risks and assumptions and supporting rationale. Through comparative analysis determine if these comparative system risks and assumptions are analogous or similar to the functional requirements, unique functions and supportability, cost and readiness drivers.

3. When a functional requirement or driver is influenced by a comparative system risk or assumption, that influence will be recorded in the column marked Risk and Assumption Review. Supporting rationale, references, etc. will be recorded in the remarks column.

PROCESS 301.2.3.2A5 - Functional Requirements/BCS Validation

PURPOSE:

This process assesses the results of the preceding reviews of functional requirements, unique requirements and supportability, cost and readiness driver review with the Baseline Comparison System. As a result, potential functional risks are identified.

PROCEDURES:

1. Compare the four preceding processes (LSA Subtasks 301.2.3.3A1 through 301.2.3.3A4) results as listed in the respective Worksheets with those functional requirements/drivers impacted.

2. Determine if these comparisons warrant a designation of a functional requirement/driver as a potential functional requirements risk. If such designation is made, so indicate it in the column marked Potential Functional Requirements Risks.

PROCESS 301.2.3.3 - Functional Requirements/Constraint Risk Assessment

PURPOSE:

The objective of this process is to assess relationships between the functional requirements, unique functional requirements and supportability, cost and readiness drivers and risks associated with supportability constraints.

PROCEDURES:

1. Obtain the results of LSA Subtask 202.2.4 which identified risks associated with supportability and supportability related design constraints.

2. Utilizing the results of LSA Subtask 202.2.4, "Mission Hardware, Software and Support System Standardization Risks", document the following on the Support Constraint Risk Identification Worksheet.

   a. If the functional requirements and support drivers are in conflict with standardization requirements of the new system due to the need to develop new support items.

SUPPORT CONSTRAINT RISK IDENTIFICATION
(PROCESS 301.2.3.3)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

FUNCTIONAL REQUIREMENTS (LSA SUBTASK 301.2.1)	UNIQUE FUNCTIONAL REQ'TS. & DRIVERS (LSA SUBTASK 301.2.2)	SPT. CONSTRAINT RISKS (LSA SUBTASK 301.2.4)	REMARKS

FUNCTIONAL REQUIREMENT/DESIGN OBJECTIVE RISK IDENTIFICATION (PROCESS 301.2.3.4)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

FUNCTIONAL REQUIREMENTS (LSA SUBTASK 301.2.1)	UNIQUE FUNCTIONAL REQ'TS. & DRIVERS (LSA SUBTASK 301.2.2)	DESIGN OBJECTIVE RISKS (LSA SUBTASK 203.2.3)	REMARKS

b. Development of new support items are in conflict with existing DOD/Army Support Policies such as requiring the use of standard test equipment or software languages.

c. Risks associated with developing new items of support.

d. If the functional requirements and support drivers require existing logistic resources; have shortages been identified or are those items being eliminated from the Army inventory.

e. Instances were the new system/equipment is going to compete for existing logistic resources.

3. If, as a result of this assessment, constraint risks are determined to impact functional requirements or drivers the column marked Support Constraint Risks will be used to indicate those relationships. The remarks column will be used to record rationale, references, source data, etc.

PROCESS 301.2.3.4 - Functional Requirements/Design Objective Risk Assessment

PURPOSE:

The purpose of this process is to determine the relationships that exist between risks associated with design objectives, as identified in LSA Subtask 204, and functional requirements, unique functional requirements and supportability, cost and readiness drivers.

PROCEDURES:

1. Obtain the risks identified in LSA Subtask 204.2.3 as being associated with design objectives.

2. Based on the results of LSA Subtask 204.2.3, "Technological Opportunity Risks", document the following potential risks:

   a. New design requirements resulting from functional requirements and supportability goals that increase logistic resource requirements, support cost and/or have a negative impact on system readiness (e.g., adding BIT detection circuitry that reduces the reliability of a circuit board).

b. Technological advances driven by the new system's functional requirements or supportability goals that require new logistic resources and therefore will impact the cost and schedule.

c. The impact of not implementing a technological opportunities on the logistics resource requirement, supportability costs, and system readiness.

3. Using the Functional Requirement/Design Object Identification Worksheet, record those instances where design objective risks directly impact a functional requirement/driver in the column marked Design Objective Risks. The remarks column will be used to record rationale, supporting data, references, etc.

PROCESS 301.2.3.5 - Functional Requirements/Supportability Risk Assessment

PURPOSE:

The objectives of this process is to assess the relationship of supportability risks associated with new technology and supportability, cost and readiness objectives risks as identified in LSA Subtask 205.2.2, and functional requirements, unique functional requirements and supportability, cost and readiness drivers.

PROCEDURES:

1. Obtain the results of LSA Subtask 205.2.2.

2. Using the results of LSA Subtask 205.2.2, "Supportability and Supportability Related Design Factor Risks", document the following impacts:

   a. Based on the functional requirements and unique supportability drivers will the identified viable support concepts pose any problems in meeting supportability, cost, and readiness objectives. Consider how the viable support concepts utilize logistic support resources and the degree of operation and support costs which will be incurred during the system life cycle.

DESIGN OBJECTIVE RISK
(PROCESS 301.2.3.5)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

FUNCTIONAL REQUIREMENTS (LSA SUBTASK 301.2.1)	UNIQUE FUNCTIONAL REQ'TS. & DRIVERS (LSA SUBTASK 301.2.2)	SUPPORT DESIGN RISKS (LSA SUBTASK 205.2.2)	REMARKS

b. Identify new technology that is proprietary or source controlled but is required because of new system functional requirements and/or unique support drivers. Identify any impact this will have on supportability, cost, or readiness.

c. Identify any system function or unique support drivers that will be impacted from items outside (GFE, ALDT) the control of the performing agency which have an impact system readiness.

3. Assess the relationship of these supportability design and technological risks with the identified functional requirements/drivers recorded in Design Objective Risk Worksheet. Determine through this assessment if these supportability risks impact the functions/drivers. Record those supportability risks impacts in the column marked Support Design Risks of the Functional Requirements Worksheet. Use the remarks column for recording supporting ratiorale, remarks, source data, etc.

PROCESS 301.2.3.6 - Functional Requirement Risk Validation

PURPOSE:

The objective of this process is to assess the potential functional requirement risks identified through comparative analysis in processes 301.2.3.3 through 301.2.3.6 and validate, when justified, these potential risks as risks involved in satisfying new system/ equipment functional requirements.

PROCESS 301.2.3.6A1 - Develop Risk Validation Criteria

PURPOSE:

This procedure is designed to establish criteria upon which to validate the previously identified potential risks associated with the new system/equipment functional requirements.

PROCEDURES:

On the Risk Validation Criteria Selection Worksheet identify the Validation Criteria based on the following factors.

1. Identify a functional requirement as a de facto risk if it has been, is currently or will be:

a. Designated a unique functional requirement or is so influenced by a unique functional requirement that it actually is or becomes a unique functional requirement.

b. Designated a supportability, cost or readiness driver or is so influenced by a supportability cost or readiness driver that it actually is or becomes such a driver.

2. Other functional requirements, which were classified as potential risks, may qualify under the weight of comparative data available or may require further and more detailed analysis.

a. Should a functional requirement be influenced by a number of assessment criteria (Processes 301.2.3.3 through 301.2.3.6 above) the weight of the data alone may warrant a designation of that functional requirement as a risk.

b. Likewise, should the weight of data indicate that further detailed analysis is necessary to identify a potential functional requirement as a risk, a more detailed analytical procedure must be selected. (Other potential functional risks may be evaluated by this method should the analyst so choose.)

c. Of the analytical options available to assess potential risks as identifiable functional requirement risks is the Venture Evaluation and Review Technique (VERT). This simulation-based risk analysis tool has proven successful in acquisition life-cycle evaluations for several Army programs and is readily adaptable to various new systems/equipment logistic analysis. Other equally appropriate computer based options exist for the analyst.

PROCESS 301.2.3.6A2 - Unique Functional Requirements Risks

PURPOSE:

This process utilizes the unique Functional Requirements Risk Worksheet, including the assessments made in prior processes, and the risk validation criteria from Process 301.2.3.6A1 to identify Unique Functional requirement risks.

RISK VALIDATION CRITERIA SELECTION
(PROCESS 301.2.3.6A1)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

VALIDATION CRITERIA	RATIONAL FOR SELECTION

UNIQUE FUNCTIONAL REQUIREMENTS RISKS
(301.2.3.6A2)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

FUNCTIONAL REQUIREMENTS (LSA SUBTASK 301.2.1)	UNIQUE FUNCTIONAL REQ'TS. & DRIVERS (LSA SUBTASK 301.2.2)	UNIQUE FUNCTIONAL RISK	REMARKS

PROCEDURES:

1. Obtain the results of Process 301.2.3.1 through 301.2.3.6.

2. Obtain the Unique Risk Validation Criteria developed in Process 301.2.3.6A1.

3. Analyze each functional requirements against the BCS and Risk data to determine those risks that are unique functions based on the Risk Validation Criteria (301.2.3.6A1).

4. Indicate in the column marked Unique Function Risks of the Worksheet by checking those functional requirement lines that are now classified as unique risks. Use the remarks to reference any related information or data.

PROCESS 301.2.3.6A3 - Supportability, Cost and Readiness Driver Risks

PURPOSE:

This process utilizes the Supportability, Cost, Readiness Driver Risk Worksheet, including the assessments made in prior processes, and the risk validation criteria in Process 301.2.3.6A1 to identify Supportability, Cost and Readiness risks.

PROCEDURES:

1. Follow the procedures outlined for Process 301.2.3.6A2 above except that supportability, cost and readiness drivers are analyzed in this process. Again, the criteria established in Process 301.2.3.6A1 will govern risk determination.

2. The column marked Support, Cost, and Readiness Driver Risks of the Worksheet will be used to document supportability, cost and readiness driver risks. The last column will be used for remarks.

PROCESS 301.2.3.6A4 - Other Identifiable Functional Requirement Risks

This process utilizes the Other Identifiable Functional Requirement Risk Worksheet, including the assessments made in prior processes, and the risk validation criteria in Process 301.2.3.6A1 to identify Other Functional Requirements.

SUPPORTABILITY, COST, READINESS DRIVER RISKS
(PROCESS 301.2.3.6A3)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

FUNCTIONAL REQUIREMENTS (LSA SUBTASK 301.2.1)	UNIQUE FUNCTIONAL REQ'TS. & DRIVERS (LSA SUBTASK 301.2.2)	SUPPORT, COST & READINESS DRIVER RISKS	REMARKS

OTHER IDENTIFIABLE FUNCTIONAL REQUIREMENTS RISKS
(PROCESS 301.2.3.6A4)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

FUNCTIONAL REQUIREMENTS (LSA SUBTASK 301.2.1)	UNIQUE FUNCTIONAL REQ'TS. & DRIVERS (LSA SUBTASK 301.2.2)	IDENTIFIABLE FUNCTIONAL REQUIREMENTS RISKS	REMARKS

PROCEDURES:

1. Follow the procedures outlined for Process 301.2.3.6A2 above except that those functional requirements influenced by the weight of assessed data as described in criteria established in Process 301.2.3.6A1 will govern a determination of risk.

2. Use the column marked Identifiable Functional Requirements Risks of the Worksheet to record these "Other" risks. Any comments or reference will be placed in the remarks column.

PROCESS 301.2.3.6A5 - VERT Based Functional Requirements Risk Identification

PURPOSE:

This process is designed to analyze the potential functional requirement risks not previously identified in Processes 301.2.3.6A2 through 301.2.3.6A4, as functional risks, and/or to provide a detailed analytical procedure for use in identifying functional requirement risks where in-depth analysis is required.

PROCEDURES:

1. Obtain the results of Processes 301.2.3.1 through 301.2.3.6A4.

2. Determine which potential functional requirements remain that require detailed analysis.

3. Select an analytical tool such as the Venture Evaluation and Review Technique (VERT), a simulation-based risk analysis model, to identify remaining functional requirement risks.

4. Record the results of VERT analysis on the Risk Analysis Worksheet if a determination is made that an analyzed functional requirement does in fact represent a functional requirement risk.

VERT RISK ANALYSIS
(PROCESS 301.2.3.6A5)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

SELECTED FUNCTIONAL REQUIREMENTS	SELECTED UNIQUE FUNCTIONAL REQ'TS. & DRIVERS	VERT RESULTS	REMARKS

PROCESS 301.2.3.6A6 - Functional Requirement Risk Consolidation

PURPOSE:

Use this process to organize and present the functional requirements risks identified in LSA Task 301.2.3.

PROCEDURES:

1. Obtain all identified risks from previous processes.

2. Consolidate this data for inclusion on the Functional Requirements Risk Consolidation Worksheet the following:

   a. Unique Functional Requirement Risks.
   b. Supportability, Cost and Readiness Driver Risks.
   c. Other Identifiable Functional Requirements Risks.
   d. VERT Functional Requirements Based Risk Identification.

3. Provide the Functional Requirement Risk Consolidation Worksheet to the new system/equipment program manager or the Integrated Logistics Support Management Team (ILSMT) as directed.

FUNCTIONAL REQUIREMENT RISK CONSOLIDATION
(PROCESS 301.2.3.6A6)

END ITEM NAME: NOMENCLATURE: PART NUMBER:	
IDENTIFIED RISK	IMPACT ON PROGRAM

ANNEX D

—

VERT BATCH INPUT FILES FOR LSA SUBTASK 301.2.3

VERT APPLICATION METHODOLOGY

BACKGROUND:

Venture Evaluation and Review Technique (**VERT**) was developed as a network analysis technique to facilitate management decision making. It allows a systematic planning and control of programs and enables managers to find solutions to real life managerial problems.

The terms of the APJ contract require the provision of batch files for each of the VERT networks associated with the various Data Flow Diagrams in the APJ 966 projects.

APJ has been successful in adopting a method for the creation of these networks using the existing EXCELERATOR software package and establishing a naming convention compatible with that used in the Data Flow Diagrams. To do this APJ has made use of the PC model of VERT. A Structured Analysis project was used for this purpose. The prototype VERT network structure was made for one top level and one lower level data flow diagram.

The PC model of VERT has certain limitations built into it. To overcome some of these limitations, certain conventions were used to create the input files. To maintain full generality a set of "dummy" default values were established. The model allows the user to alter the default values of time, cost, and performance to satisfy their specific requirements.

METHODOLOGY:

The basic symbols used to structure the network are :

(i) **SQUARES** - to indicate NODES. These are decision points in the project, or points beyond which the project cannot proceed unless certain criteria are met. There are two types of nodes, one which supports input operations and, the second type which supports output operations.

(ii) **LINES** - to indicate ARCS which are activities that have time, cost, and performance criteria associated with them.

In practice, however, both the arcs and nodes are similar, in that both have time, cost, and performance criteria associated with them. The arcs have a primary and a cumulative set of time, cost, and performance criteria whereas the nodes have only a single cumulative set.

(iii) **NAMING CONVENTIONS** - Efforts have been made to keep the naming convention as compatible as possible to the Data Flow Diagrams. The naming convention used is displayed below.

NODES - All nodes are prefixed with the letter **N**. The individual Nodes are identified by a number and a letter. The number refers to the number of the node within the diagram and the letter refers to the diagram number in the project. In the event that a node has been referenced in an earlier diagram they also carry the number of the node in the earlier diagram as a prefix to the individual node number.

N2.4A

N - All nodes are prefixed with the letter **N**
2 - Gives the number of the node it relates to in a higher level diagram or an earlier data flow diagram within the project. In this case it refers to node **N2** of the top level diagram.
4 - Gives the number of the node in the present data flow diagram.
A - The nodes in each subsequent explosion are allotted an alphabetical suffix indicating the number of the explosion diagram in the particular project. In this case, it is the first lower level diagram within the project.

ARCS - All arcs are prefixed with either the letter **C** or **E**. The individual Arcs are identified by two numbers. The first number refers to the number of the arc within the diagram and the second number refers to the number of the diagram within the project. In the event that an arc has been referenced in an earlier diagram they also carry the number of the arc in the earlier diagram as a prefix to the individual arc number. The arcs which are identified by the letter **E** have direct reference to a process in the corresponding data flow diagram and as such are named the same as the process itself.

C3.3.8.4 **E12.1A2**

C - All arcs are prefixed with the letter **C**. In some cases, however, arcs carry a prefix of **E**. These particular arcs correspond to a process within the data flow diagram and are thus named the same as the process itself.

3.3 - Gives the number of the arc it relates to in a higher level diagram or an earlier data flow diagram within the project. In this case, it refers to arc number 3 in lower level diagram #3 within the project.

8.4 - Indicates that this particular arc is the #8 arc in the #4 lower level diagram of the project.

BATCH FILES

INPUT FILES - The input file names are given the extension *.**IN**.
OUTPUT FILES - The simulation output files are given the extension *.**OU**.
PRINT FILES - The print files have been given the extension *.**PR**.

(This would allow subsequent updates of the input files to be numbered as **IN1**...,**OU1**...,**PR1**... etc.)

DEFAULT SETTINGS:

Control Record:

(i) The output option selected is "0" which provides a detailed listing, and high level of summary information.

(ii) The input record listing option selected is "0" which prints all input records.

(iii) The composite terminal node output option selected is "16" which assumes family mode and intrafamily transfer of histogram data.

(iv) The number of iterations used are "10" in the demonstration model to facilitate operation in the debug mode if required.

(v) The composite node name and the network name are left as blanks.

(vi) In the run identification the name of the corresponding Data Flow Diagram is used as identification for the network description.

Arc Records:

(i) For each of the arcs the following records are provided:
   (a) Master Arc Record
   (b) Time Distribution Satellite
   (c) Cost Distribution Satellite
   (d) Performance Distribution Satellite

(ii) The Distribution Satellite Records are created to provide a uniform statistical distribution.

(iii) The default values used for the minimum and maximum in each criteria are:

TIME	10.0	20.0
COST	10.0	100.0
PERFORMANCE	10.0	50.0

Node Records:

(i) Input Logic - The input logic for the nodes are either "**INITIAL**" or "**AND**".

(ii) Output Logic - The output logic has been defaulted to "**AND**" or "**TERMINAL**".

(iii) The output option indicator and the storage option indicator are defaulted to read "0".

(iv) The node description has also been left blank.

(It is again noted that the user can change the default values to desired values as identified by the particular requirement and applications.)

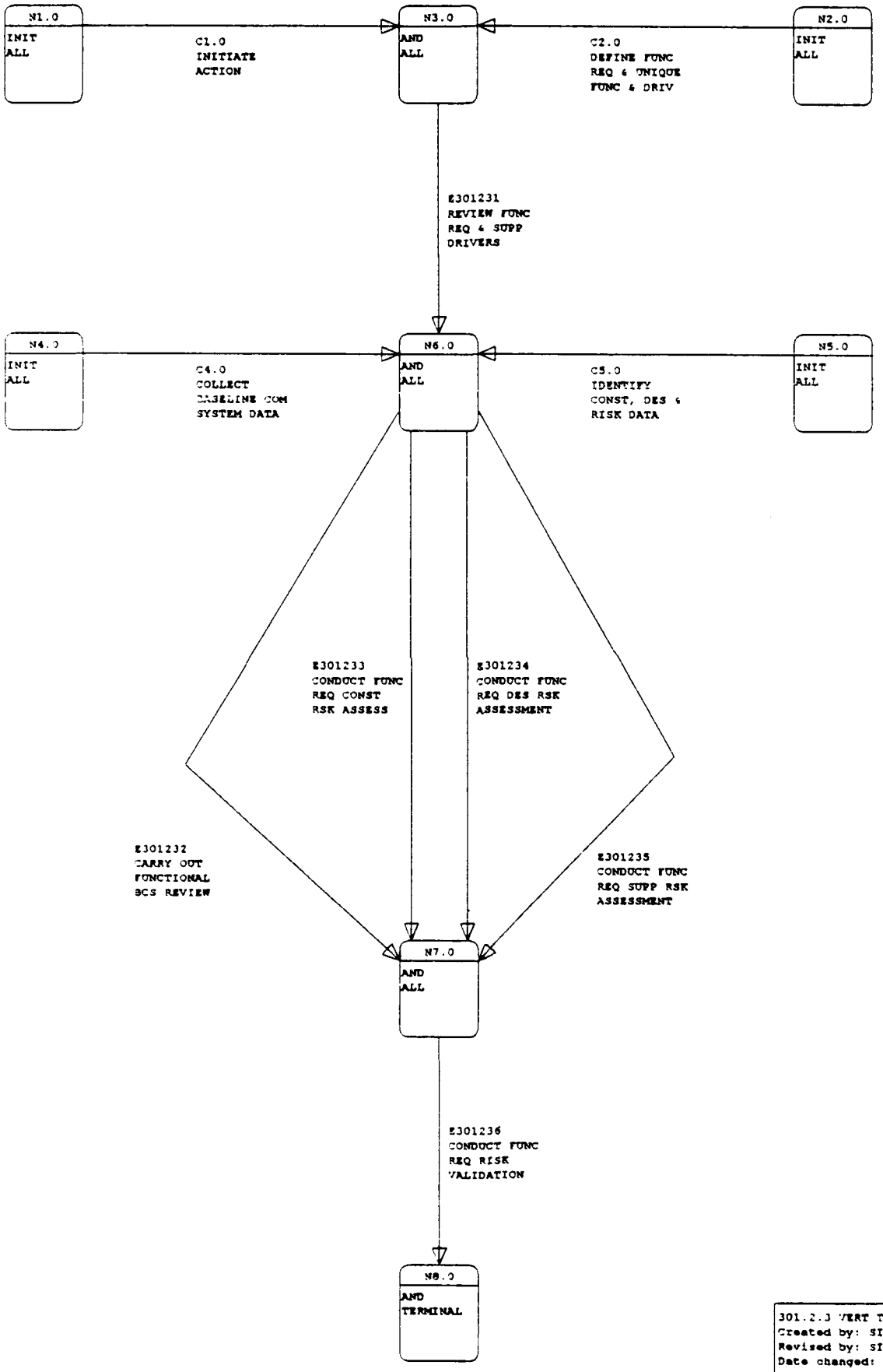
DOCUMENTATION:

With every project report APJ will be providing the following documents relating to the VERT:

(i) A VERT network diagram corresponding to a particular data flow diagram.

(ii) A print out of the VERT network inputs for the particular data flow diagrams.

(iii) A floppy disc containing sample input, print, and the simulation output files for the default VERT network.


N1.0
INIT
ALL
C1.0
INITIATE
ACTION
N3.0
AND
ALL
C2.0
DEFINE FUNC
REQ & UNIQUE
FUNC & DRIV
N2.0
INIT
ALL
E301231
REVIEW FUNC
REQ & SUPP
DRIVERS
N4.0
INIT
ALL
C4.0
COLLECT
BASELINE COM
SYSTEM DATA
N6.0
AND
ALL
C5.0
IDENTIFY
CONST, DES &
RISK DATA
N5.0
INIT
ALL
E301233
CONDUCT FUNC
REQ CONST
RSK ASSESS
E301234
CONDUCT FUNC
REQ DES RSK
ASSESSMENT
E301232
CARRY OUT
FUNCTIONAL
BCS REVIEW
E301235
CONDUCT FUNC
REQ SUPP RSK
ASSESSMENT
N7.0
AND
ALL
E301236
CONDUCT FUNC
REQ RISK
VALIDATION
N8.0
AND
TERMINAL
301.2.3 VERT TOP LEVEL
Created by: SID
Revised by: SID
Date changed: 08-NOV-89

```
      N E W    N E T W O R K                    PAGE   1
                1         2         3         4         5         6         7
    12345678901234567890123456789012345678901234567890123456789012345678901 2
 1. 0016  10                   FUNCTIONAL REQUIREMENT RISK IDENTIFICATION
                +         +         +         +         +         +         +
 2. C1.0     N1.0     N3.0      1.0 INITIATE ACTION
 3. C1.0     DTIME 1          2       10.0      20.0
 4. C1.0     DCOST 1          2       10.0     100.0
 5. C1.0     DPERF 1          2       10.0      50.0
                +         +         +         +         +         +         +
 6. C2.0     N2.0     N3.0      1.0 DEF FUNCTIONAL RQMNTS & UNIQUE FUNCTIONS &
 7. C2.0     DTIME 1          2       10.0      20.0
 8. C2.0     DCOST 1          2       10.0     100.0
 9. C2.0     DPERF 1          2       10.0      50.0
                +         +         +         +         +         +         +
10. E301231 N3.0     N6.0      1.0 REVIEW FUNCTIONAL RQMNTS AND SUPPORTABILITY
11. E301231 DTIME 1          2       10.0      20.0
12. E301231 DCOST 1          2       10.0     100.0
13. E301231 DPERF 1          2       10.0      50.0
                +         +         +         +         +         +         +
14. C4.0     N4.0     N6.0      1.0 COLLECT BASELINE COMPARISON SYSTEM DATA
15. C4.0     DTIME 1          2       10.0      20.0
16. C4.0     DCOST 1          2       10.0     100.0
17. C4.0     DPERF 1          2       10.0      50.0
                +         +         +         +         +         +         +
18. C5.0     N5.0     N6.0      1.0 IDENTIFY CONSTRUCTION DESIGN AND RISK DATA
19. C5.0     DTIME 1          2       10.0      20.0
20. C5.0     DCOST 1          2       10.0     100.0
21. C5.0     DPERF 1          2       10.0      50.0
                +         +         +         +         +         +         +
22. E301232 N6.0     N7.0      1.0 CARRY OUT FUNCTIONAL BCS REVIEW
23. E301232 DTIME 1          2       10.0      20.0
24. E301232 DCOST 1          2       10.0     100.0
25. E301232 DPERF 1          2       10.0      50.0
                +         +         +         +         +         +         +
26. E301233 N6.0     N7.0      1.0 CONDUCT FUNC RQMNT CONSTRUCTION RISK ASSESS
27. E301233 DTIME 1          2       10.0      20.0
28. E301233 DCOST 1          2       10.0     100.0
29. E301233 DPERF 1          2       10.0      50.0
                +         +         +         +         +         +         +
30. E301234 N6.0     N7.0      1.0 CONDUCT FUNCTIONAL RQMNT DESIGN RISK ASSESS
31. E301234 DTIME 1          2       10.0      20.0
32. E301234 DCOST 1          2       10.0     100.0
33. E301234 DPERF 1          2       10.0      50.0
                +         +         +         +         +         +         +
34. E301235 N6.0     N7.0      1.0 CONDUCT FUNC RQMNT SUPPORTABILITY RISK ASSE
35. E301235 DTIME 1          2       10.0      20.0
36. E301235 DCOST 1          2       10.0     100.0
37. E301235 DPERF 1          2       10.0      50.0
                +         +         +         +         +         +         +
38. E301236 N7.0     N8.0      1.0 CONDUCT FUNCTIONAL REQUIREMENT RISK VALIDAT
39. E301236 DTIME 1          2       10.0      20.0
40. E301236 DCOST 1          2       10.0     100.0
41. E301236 DPERF 1          2       10.0      50.0
                +         +         +         +         +         +         +
42. ENDARC
                +         +         +         +         +         +         +
43. N1.0     1  2 0 0
                +         +         +         +         +         +         +
                1         2         3         4         5         6         7
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      123456789012345678901234567890123456789012345678901234567890123456789012
1        N E W    N E T W O R K                 PAGE   2
                1         2         3         4         5         6         7
      123456789012345678901234567890123456789012345678901234567890123456789012
   44. N3.0    2  2 0 0
                +         +         +         +         +         +         +
   45. N2.0    1  2 0 0
                +         +         +         +         +         +         +
   46. N6.0    2  2 0 0
                +         +         +         +         +         +         +
   47. N4.0    1  2 0 0
                +         +         +         +         +         +         +
   48. N5.0    1  2 0 0
                +         +         +         +         +         +         +
   49. N7.0    2  2 0 0
                +         +         +         +         +         +         +
   50. N8.0    2  1 0 0
                +         +         +         +         +         +         +
   51. ENDNODE
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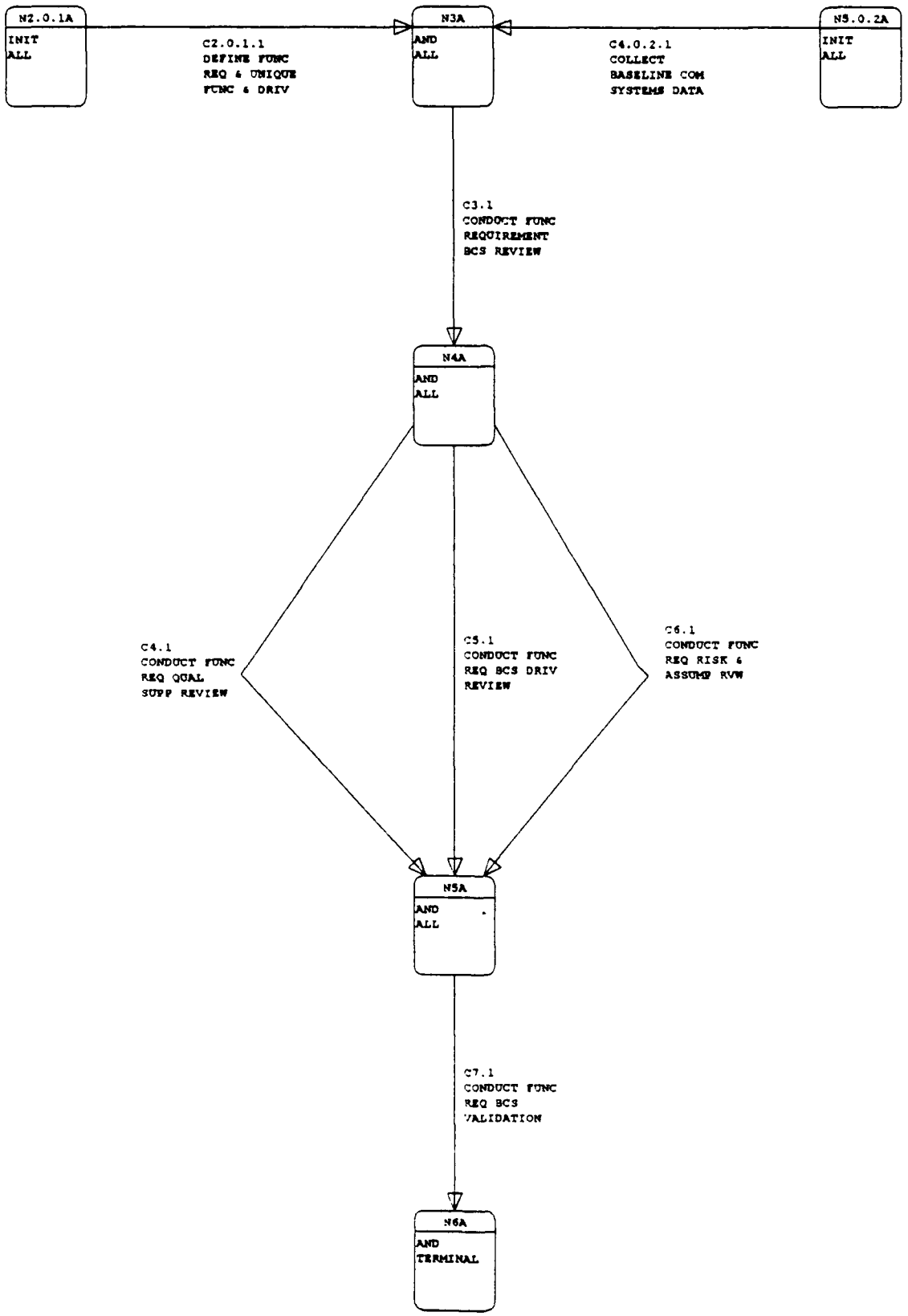

301.2.3.2A VERT
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Revised by: SID
Date changed: 27-OCT-89

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                1         2         3         4         5         6         7
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    1. 0016  10                    FUNCTIONAL REQUIREMENT/BASELINE COMPARISON SYSTE
                   +         +         +         +         +         +         +
    2. C2.0.1.1N2.0.1A N3A          1.0 DEF FUNCTIONAL RQMNTS & UNIQUE FUNCTIONS &
    3. C2.0.1.1DTIME 1         2      10.0      20.0
    4. C2.0.1.1DCOST 1         2      10.0     100.0
    5. C2.0.1.1DPERF 1         2      10.0      50.0
                   +         +         +         +         +         +         +
    6. C4.0.2.1N5.0.2A N3A          1.0 COLLECT BASELINE COMPARISON SYSTEMS DATA1
    7. C4.0.2.1DTIME 1         2      10.0      20.0
    8. C4.0.2.1DCOST 1         2      10.0     100.0
    9. C4.0.2.1DPERF 1         2      10.0      50.0
                   +         +         +         +         +         +         +
   10. C3.1        N3A       N4A       1.0 CONDUCT FUNC RQMNT BASELINE COMPARISON SYS
   11. C3.1        DTIME 1         2      10.0      20.0
   12. C3.1        DCOST 1         2      10.0     100.0
   13. C3.1        DPERF 1         2      10.0      50.0
                   +         +         +         +         +         +         +
   14. C4.1        N4A       N5A       1.0 CONDUCT FUNC RQMNT QUALITATIVE SUPPORTABILI
   15. C4.1        DTIME 1         2      10.0      20.0
   16. C4.1        DCOST 1         2      10.0     100.0
   17. C4.1        DPERF 1         2      10.0      50.0
                   +         +         +         +         +         +         +
   18. C5.1        N4A       N5A       1.0 CONDUCT FUNCTIONAL REQUIREMENT BCS DRIVERS
   19. C5.1        DTIME 1         2      10.0      20.0
   20. C5.1        DCOST 1         2      10.0     100.0
   21. C5.1        DPERF 1         2      10.0      50.0
                   +         +         +         +         +         +         +
   22. C6.1        N4A       N5A       1.0 CONDUCT FUNC RQMNT RISK & ASSUMPTIONS REVIE
   23. C6.1        DTIME 1         2      10.0      20.0
   24. C6.1        DCOST 1         2      10.0     100.0
   25. C6.1        DPERF 1         2      10.0      50.0
                   +         +         +         +         +         +         +
   26. C7.1        N5A       N6A       1.0 CONDUCT FUNCTIONAL REQUIREMENT BCS VALIDATI
   27. C7.1        DTIME 1         2      10.0      20.0
   28. C7.1        DCOST 1         2      10.0     100.0
   29. C7.1        DPERF 1         2      10.0      50.0
                   +         +         +         +         +         +         +
   30. ENDARC
                   +         +         +         +         +         +         +
   31. N2.0.1A 1   2 0 0
                   +         +         +         +         +         +         +
   32. N3A     2   2 0 0
                   +         +         +         +         +         +         +
   33. N5.0.2A 1   2 0 0
                   +         +         +         +         +         +         +
   34. N4A     2   2 0 0
                   +         +         +         +         +         +         +
   35. N5A     2   2 0 0
                   +         +         +         +         +         +         +
   36. N6A     2   1 0 0
                   +         +         +         +         +         +         +
   37. ENDNODE
                1         2         3         4         5         6         7
       12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
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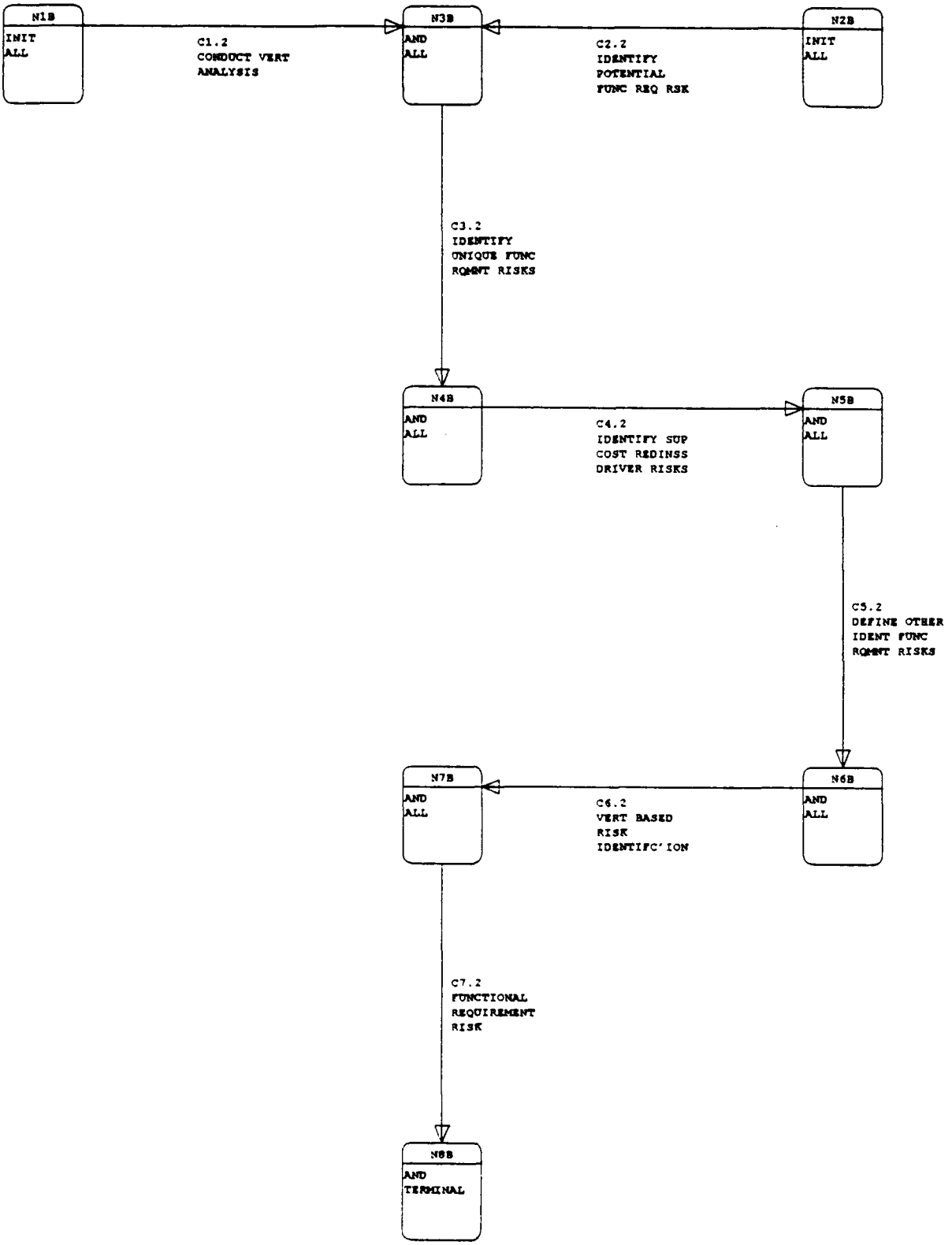

301.2.3.6A VERT
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               1         2         3         4         5         6         7
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 1. 0016  10                    FUNCTIONAL REQUIREMENT RISK VALIDATION
               +         +         +         +         +         +         +
 2. C1.2     N1B      N3B       1.0 CONDUCT VENTURE EVALUATION REVIEW TECH ANAL
 3. C1.2     DTIME 1           2       10.0      20.0
 4. C1.2     DCOST 1           2       10.0     100.0
 5. C1.2     DPERF 1           2       10.0      50.0
               +         +         +         +         +         +         +
 6. C2.2     N2B      N3B       1.0 IDENTIFY POTENTIAL FUNCTIONAL REQUIREMENT R
 7. C2.2     DTIME 1           2       10.0      20.0
 8. C2.2     DCOST 1           2       10.0     100.0
 9. C2.2     DPERF 1           2       10.0      50.0
               +         +         +         +         +         +         +
10. C3.2     N3B      N4B       1.0 IDENTIFY UNIQUE FUNCTIONS REQUIREMENTS RISK
11. C3.2     DTIME 1           2       10.0      20.0
12. C3.2     DCOST 1           2       10.0     100.0
13. C3.2     DPERF 1           2       10.0      50.0
               +         +         +         +         +         +         +
14. C4.2     N4B      N5B       1.0 IDENTIFY SUPPORT COST READINESS DRIVER RISK
15. C4.2     DTIME 1           2       10.0      20.0
16. C4.2     DCOST 1           2       10.0     100.0
17. C4.2     DPERF 1           2       10.0      50.0
               +         +         +         +         +         +         +
18. C5.2     N5B      N6B       1.0 DEFINE OTHER IDENTIFIABLE FUNCTIONS RQMNT R
19. C5.2     DTIME 1           2       10.0      20.0
20. C5.2     DCOST 1           2       10.0     100.0
21. C5.2     DPERF 1           2       10.0      50.0
               +         +         +         +         +         +         +
22. C6.2     N6B      N7B       1.0 VERT BASED RISK IDENTIFICATION
23. C6.2     DTIME 1           2       10.0      20.0
24. C6.2     DCOST 1           2       10.0     100.0
25. C6.2     DPERF 1           2       10.0      50.0
               +         +         +         +         +         +         +
26. C7.2     N7B      N8B       1.0 DERIVE FUNCTIONAL REQUIREMENT RISK DATA
27. C7.2     DTIME 1           2       10.0      20.0
28. C7.2     DCOST 1           2       10.0     100.0
29. C7.2     DPERF 1           2       10.0      50.0
               +         +         +         +         +         +         +
30. ENDARC
               +         +         +         +         +         +         +
31. N1B      1  2 0 0
               +         +         +         +         +         +         +
32. N3B      2  2 0 0
               +         +         +         +         +         +         +
33. N2B      1  2 0 0
               +         +         +         +         +         +         +
34. N4B      2  2 0 0
               +         +         +         +         +         +         +
35. N5B      2  2 0 0
               +         +         +         +         +         +         +
36. N6B      2  2 0 0
               +         +         +         +         +         +         +
37. N7B      2  2 0 0
               +         +         +         +         +         +         +
38. N8B      2  1 0 0
               +         +         +         +         +         +         +
39. ENDNODE
               1         2         3         4         5         6         7
```

ANNEX E

STRUCTURED SYSTEMS ANALYSIS
Fundamentals

NOTE: Our presentation of Structured Analysis Fundamentals with the associated figures is reproduced verbatim in each report.

ANNEX E
STRUCTURED SYSTEMS ANALYSIS

Fundamentals

Structured Systems Analysis (SSA) has recently become an industry standard for generating Data Flow Diagrams (replacing "logic diagrams" or "flow charts") to aid in coordinating the functions to be performed by a computer program and its associated Inputs/Outputs (I/O). During the SSA, each set of "flow charts" can be checked by the potential user to assure that there is complete agreement on what is to be done by the program, and how it is to be accomplished. It also provides considerable flexibility for updating or changing the program.

Six basic elements (see Figure 1) are used in SSA:

1. Process (PRC)
2. Data Flow (DAF)
3. Data Store (DAS)
4. External Entity (EXT)
5. Data Flow Diagram (DFD)
6. Data Dictionary (DCT)

PROCESS (Represented by a Circle):

A function or operation to be performed which can be explained by a set of instructions representing a single task, e.g., "calculate interest on a loan", "prepare a draft report". If the Process description is too complex to describe in a few steps, it may be necessary to develop a lower level description (see below).

DATA FLOW (Lines interconnecting Processes or I/Os):

Each function or Process cannot be a stand-alone in a complex network. To have any meaning in a program, each process must be initiated by a previous action and/or provided information on which to act. Furthermore, a Process must result in an output which is the input to the next logical Process. These inputs, outputs, or initiating actions are identified as Data Flows, and are represented by the Data Flow lines indicating its point of origin and the process to which it provides data.

DATA STORE (Represented by two parallel lines):

Although some Processes generate data used as input to a succeeding Process, there is often a need to "gather or collect" information from files in which it is stored. This information may come from an external source (such as a MIL-STD, Army regulation, historical experience files, etc.), or an internal source or file in which data is temporarily stored for use by succeeding processes. These Data Stores can be visualized as a "file cabinet", in which the data are stored for later retrieval).

EXTERNAL ENTITY (Represented by a Rectangle):

Each program or logical process must have an initiating action, a "point" of disposition of the results, and possible input guidance or instructions. Each of these have authorities, functions, or applications which are independent of the program Process (although required by the program Process). Thus, these activities, agencies, or facilities are considered "External Entities" to the program.

DATA FLOW DIAGRAM:

The general arrangement of the above can be readily seen. First, the circle or Process describes what has to be done; the interconnecting lines represent the Data Flows, together with the specific description of all I/Os. The Data Stores identify the source and/or file designation of a data base, and the External Entities represent those activities remote from the Process, which are the source of guidance or the recipients of the program. This combination of Processes, Data Flows, Data Stores, and External Entities constitutes a "Data Flow Diagram". The unique feature of the Data Flow Diagram (DFD) is that each process can be considered independently, permitting a change to be made in one Process without a major change in the overall program.

DATA DICTIONARY:

The Data Dictionary consists of a complete description of each of the basic elements. For the Process, it contains a step-by-step description of what has to be performed. The description of the Data Flow identifies the nomenclature of the data, a detailed description of its content, and its source. The Data Stores and External Entities are described, including possible location.

The Data Dictionary (a living document) begins with a description of the first Process and is continually built-up as the Data Flow Diagrams are expanded, detailed, and eventually completed.

APPROACH TO PERFORMING STRUCTURED SYSTEM ANALYSIS:

The best approach to Structured Systems Analysis is to assume that the program consists of a series of processes, each of which are to be assigned to an inexperienced analyst. Each analyst is to be walked through the assigned process of the Program, explaining step-by-step functions have to be performed or what actions have to be taken to accomplish the process. The analyst is also informed where the information is coming from (input Data Flow), what is to be generated by each process (output Data Flow), where the data base may to be found (Data Stores), and who to contact for guidance (External Entities).

The best way to initiate a SSA is to set down the point of origin of a program, its final goal(s), and the intermediate functions or actions needed to get from beginning to goal. Each step should be considered as a Process - some may be sequential and others parallel. Then, the steps needed to accomplish the Process should be described. If the description is complex and needs intermediate steps, the Process is then a candidate for an "explosion". That is, the top (or upper) level Process is considered as a "project" and its own Data Flow Diagram is prepared.

When writing the step-by-step procedures in the Process, certain elements of data (or information) must be made available for the procedure. Each element of data is considered as an input Data Flow, which is identified and described. The product (or result) of a Process is an output Data Flow element.

Each Data Flow to the Process must originate from:

1. an earlier Process
2. a Data Store (or file)
3. an External Entity.

These sources are also identified, described and put into the Data Dictionary. As soon as the last portion of the Data Flow Diagram has been described, the SSA is complete.

The structured Analysis phase is followed by Structured Design, then by programming and finally software test and validation. The organization of Structured Analysis and its relationship to Structured System Design is shown on below on Figure 2.

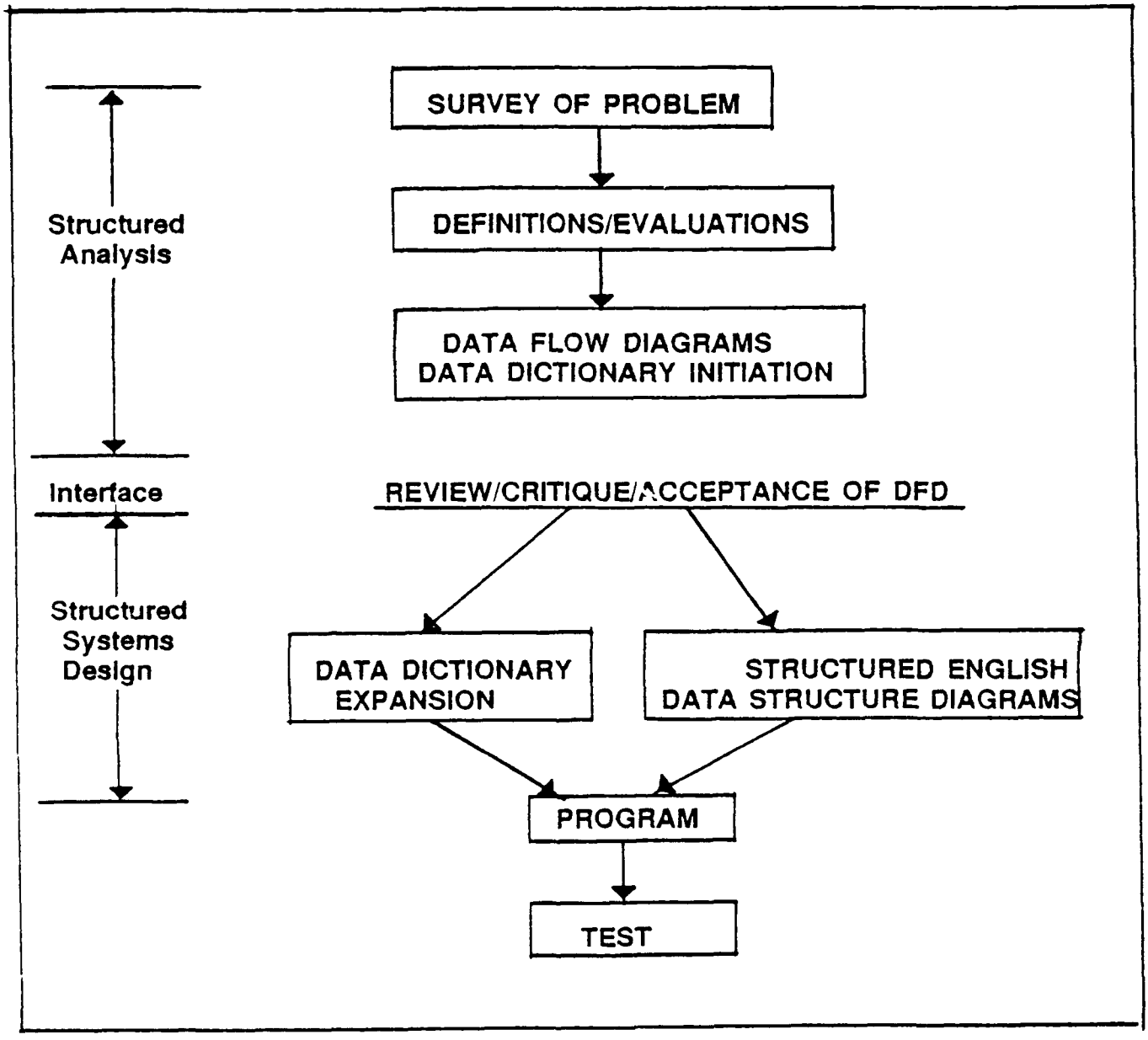

Figure 1. Structured Analysis & Structured Systems Design Organization

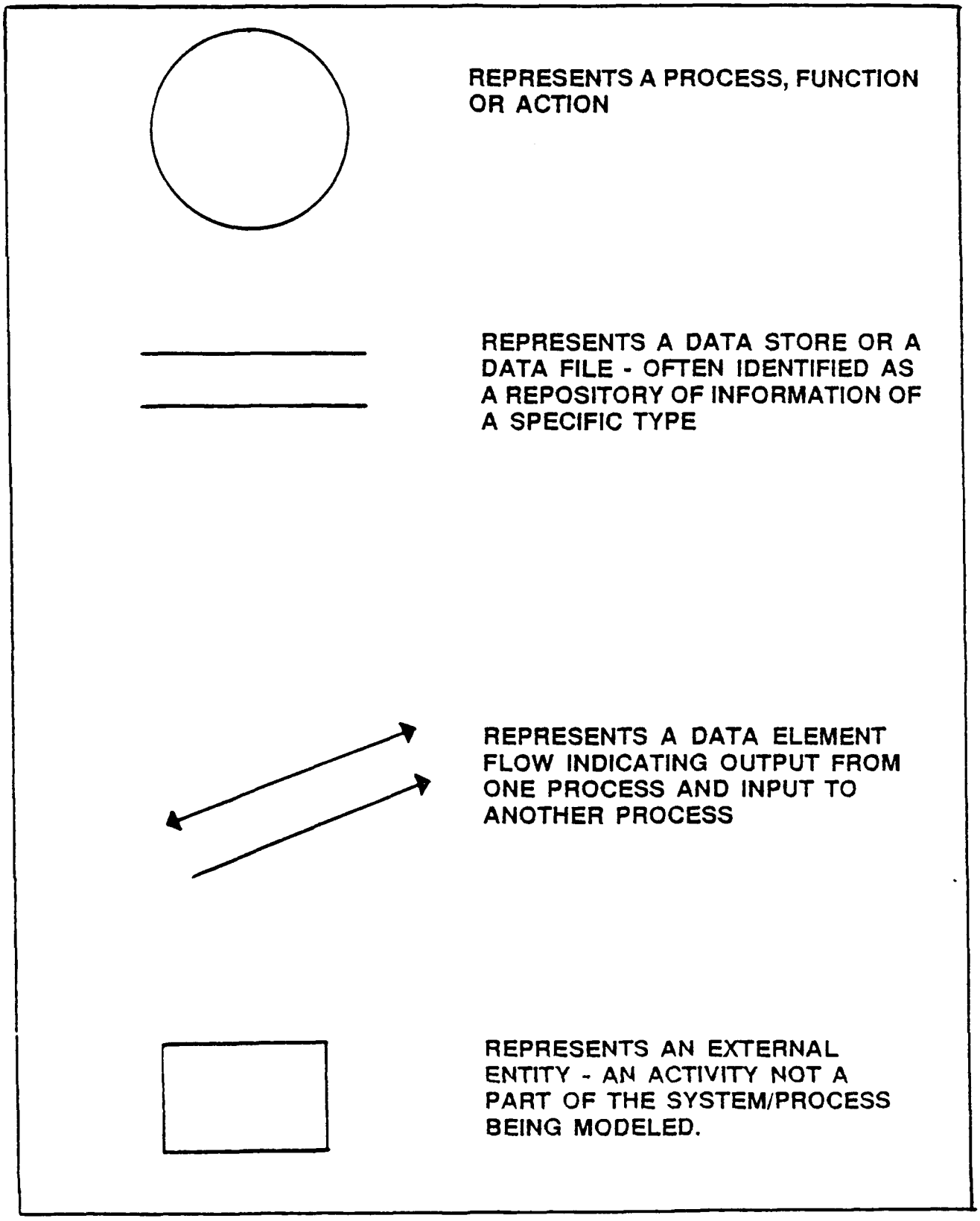

Figure 2. Standard DFD Symbol Definitions